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Abstract

Using fixed effects panel data models on a sample of 15 OECD countries over the period 1970-2007, this article explores the linkages between labor-market volatility, financial development and welfare state institutions. We analyze the interacted impact of financial development on the one hand and welfare state institutions (*i.e.*, overall social spending) on the other hand on volatility of hours worked and volatility of wages. Our results indicate that financial development is associated with higher volatility on labor-markets. Estimates of the marginal effects show that overall social spending increasingly reduces labor-market volatility with the degree of financial development, and more specifically for low-skilled workers through compensation mechanisms. Finally, we control for potential reversed causality by running IV-GMM estimations suggesting that increasing financial development has not threatened the governments' ability to play an active role in cushioning fluctuations on labor markets.

Résumé

VOLATILITÉ SUR LE MARCHÉ DU TRAVAIL, DÉVELOPPEMENT FINANCIER ET DÉPENSES DE SÉCURITÉ SOCIALE

A l'aide de modèles à effets fixes sur données de panel sur un échantillon comprenant 15 pays de l'OCDE de 1970 à 2007, cet article s'intéresse aux interactions entre le niveau de développement financier et les institutions de protection sociale (mesurée à l'aide du poids des dépenses de sécurité sociale dans le PIB) sur la volatilité sur le marché du travail. Plus particulièrement, nous cherchons à expliquer les déterminants de la volatilité du nombre d'heures travaillées et

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de la volatilité des salaires. Nous trouvons que le développement financier est associé avec une augmentation de la volatilité sur le marché du travail. Les effets marginaux montrent qu'augmenter les dépenses de sécurité sociale contribue à réduire l'impact du développement financier sur la hausse de la volatilité, et ceci plus particulièrement pour les travailleurs faiblement qualifiés à travers un mécanisme de compensation. Enfin, nous contrôlons la causalité inverse à l'aide d'estimations à variables instrumentales (IV-GMM) dont les résultats indiquent que le développement croissant des marchés financiers a faiblement affaibli la capacité des gouvernements à mettre en œuvre des politiques afin d'atténuer les fluctuations sur le marché du travail.

Keywords: Labor-market volatility, financial development, social security expenditure, compensation hypothesis

Mots-clés: Volatilité du marché du travail, développement financier, dépenses de sécurité sociale, hypothèse de compensation

JEL Classification: F41 · I3 · P16

1 Introduction

The recent financial crisis and the subsequent economic recession have caused an unprecedented increase in the unemployment rate in most OECD countries: the unemployment rate rose from an average of 5.96% in 2008 to 8.13% in 2009. In the wake of the *subprime* crash, a majority of political leaders - on both the left and on the right - sharply damned financial capitalism.[1] Many political leaders and scholars have stressed the consequences of increasing instability on financial markets on the whole economy at the international and domestic levels.

The main issue that we address in this paper deals with the impact of financial markets at the international and domestic levels on the labor market instability. According to the standard efficient market hypothesis, more efficient financial markets should contribute to reducing significantly risks in the economy, including the risks for workers. We argue that the instability of financial markets can impact the firms' financial strategy which can affect the fluctuations on labor markets. Data on labor market volatility reveal that the volatility of wages growth has increased since several decades, and this more specifically for low-skilled workers. Our main hypothesis is that financial markets are likely to affect the workers' welfare, and more specifically for low-skilled workers. This arguments is directly derived from the Rodrik's (1997) work who argues that trade development intensified competition from low-wage countries and may be harmful particularly for low-skilled workers. Trade openness

[1] For instance,"We have over-mutualized risk and so diluted accountability. If the risks are shared ad infinitum, there's no longer anyone accountable. [...] Purely financial capitalism is a perversion that could threaten the global economy" (French President N. Sarkozy, speech in Davos, January 27, 2010).

has increased indeed the elasticity of labor demand for this category of workers. We assume in this paper that financial development - at the international level as well as at the domestic level - may have amplified this effect.

This paper explores the role of increasing financial development and its interactions with welfare state institutions on labor-market volatility in 15 OECD countries. First, recent literature in economics has focused on the role of financial development on macroeconomic volatility (*i.e.*, volatility in output or consumption growth). Few papers have analyzed the relationship between financial development and labor-market volatility. We argue that financial development might also affect the fluctuations and the distribution of risks on labor markets. We distinguish two different channels: in a first channel, financial openness through an increase in foreign direct investment (FDI) has contributed to the increase in labor-market volatility; in a second channel, financial development has led financial participants to use more sophisticated instruments and to take excessive risks which has created instability on labor markets.

In his seminal work, Rodrik (1997) argues that globalization is associated with an increased dispersion of earnings among low-skilled workers and higher volatility in wages and hours worked. Trade openness has therefore asymmetric effects between owners of capital and high-skilled workers on the one hand and semiskilled and unskilled workers on the other hand. The first category is composed on very mobile actors whereas globalization has increased the elasticity of the demand for the services provided by workers from the second category of workers. One of the other consequences associated with increased trade openness is that wages for unskilled workers have been eroding and then labor-market instability and insecurity have been increasing. These two phenomena have resulted in an inward shift in the demand curve and a flattening of the demand curve for low-skilled labor. Consequently, according to Rodrik (1997), these changes would be associated with increased volatility in wages and hours worked. OECD (2007) provides empirical evidence suggesting that labor demand has become more responsive to shocks. Empirical findings also indicate that the elasticity of labor demand is considerably higher for low-skilled workers than for high-skilled workers. One of the potential explanation of this would be that easier offshoring of production may have significantly raised the volatility of employment and wages. We suppose in this paper that financial development at the international and domestic levels has increased short-term fluctuations in labor demand: first, financial development at the domestic and international levels reduces the bargaining position of labor (Jayadev, 2007). Accordingly, it was very frequently shown that financial development and more specifically financial openness (through foreign direct investment) has contributed to making employers more sensible to labor costs (International Institute for Labour Studies, 2008). We argue that this effect should be larger for low-skilled workers than for high-skilled workers according to the 'capital-skill complementarity' hypothesis (Griliches, 1969). In reaction to this more insecure context, Rodrik argues that gov-

ernments will increase welfare state spending to compensate the negative impact of globalization on the welfare of low-skilled workers. Beyond trade globalization, we extend Rodrik's argument to financial development including an international dimension with financial openness and a domestic dimension with financial deregulation.

We use to measure labor market instability two different proxies for labor market volatility. Using the EU KLEMS database that provides data on averages wages and hours worked by skill groups from 1970 to 2007, we compute two different measures of labor-market volatility as the rolling standard deviation for growth rates of average wages and of hours worked over a five-year-window at the aggregate level to obtain a measure of volatility. To capture financial development, we use different measures of financial integration at the international and domestic levels. We use social security transfers as a percentage of GDP as a measure of welfare state institutions. As robustness checks we use an alternative measure of welfare state institutions: government employment.

Using panel data on 15 OECD countries from 1970 to 2005, we first run PCSE/OLS regressions. Then, to consider the argument that globalization would reduce the governments' ability to compensate labor-market volatility but also to address the endogeneity issue of welfare state institutions, we run IV-GMM estimations. Our results indicate strong evidence of a positive effect of financial integration at the international and domestic levels on volatility of wages and of hours worked. We find that financial development increases the volatility of hours particularly for low-skilled workers and the volatility of wages particularly for high-skilled workers. In addition, our main argument of complementarity between financial development and welfare state institutions is empirically verified: social security transfers contribute to the reduction in labor market volatility associated with financial development.

The paper is organized as follows. Section 2 presents our main argument on the linkages between financial development, risk diversification and labor market instability. In Section 3, we present our data. we conduct in Section 4 a regression analysis. Section 5 concludes.

2 Labor-market volatility, financial development and welfare state institutions

In *The General Theory of Employment, Interest, and Money*, Keynes (1936) underlined the dual role of financial markets. On the one hand, stock markets facilitate productive investments by transferring risk from firm owners to capital holders. In this line, Keynes (1936) has stressed that capital markets by increasing financial liquidity play a positive role: higher liquidity on the financial markets that allow to convert a security into currency immediately and freely has the main advantage of increasing the access to abundant capital inflows. On the other hand, the expansion of security markets contributes to making more complex investment decisions. Henceforth, lenders are able to pledge funds for a whole lifespan of capital goods but also have the possibility

of reviewing their commitments at any time by selling their assets. In this sense, "with the separation between ownership and management which prevails to-day and with the development of organised investment markets, a new factor of great importance has entered in, which sometimes facilitates investment but sometimes *adds greatly to the instability of the system*" (Keynes, p.150-151, emphasis added).

Alternatively, according to the efficiency market hypothesis, the risks should be diversified to be reduced. The diffusion of financial innovations - in the first place the operations of 'securitization' - that took place in the 1980s in the wake of financial liberalization process played a considerable role in the process of the 'Great Moderation' that refers to a reduction in the volatility of business cycle fluctuations starting in the mid-1980s. In other words, the advanced economies would have been less volatile and safer: the Great Moderation thus denotes a new era of low risks and high returns. In that sense, securitization played a central role in the Great Moderation: the aim of securization is to promote liquidity on financial markets by improving the possibilities of risk diversification (Orléan, 2009). As we review in the related literature, financial development may have contributed to a significant reduction in output volatility in the 1980s-1990s, but at the same time labor-market volatility has sharply increased, and this more particularly for low-skilled workers (See Table 1). In this vein, a report from the International Institute for Labour Studies (2008) finds mixed evidence on a positive effect of financial market development on employment growth, partly because of increased turbulence on the labor market.

In addition, the recent financial crisis has brought back the thesis of 'financial fragility' developed by Minsky (1986). The argument of the thesis of financial fragility is that, in times of prosperity, the state of confidence increases as the participants on financial markets underestimates the risk of bubble bursting. Financial innovations - such as derivatives - have contributed to the efficiency of financial markets by reducing transaction costs, increasing financial liquidity and by enhancing the diffusion of the information. At the same time, these innovations can lead the agents to underestimate or misperceive the risks on the market, and thus to take excessive risks (Capelle-Blancard, 2009). In line with Minsky's analysis, Aglietta and Rebérioux (2005) share the main idea that financial markets are inherently unstable: moreover, beyond inefficiencies in asset pricing method, shareholder value maximization strategy is incongruent with chronic financial instability. Following this viewpoint, we argue that instability on financial markets may directly impact fluctuations on labor markets.[2]

The aim of this paper is to analyze the relationship between financial development and labor-market volatility. The impact of increasing financial development on macroeconomic volatility (and more specifically on output volatility) has remained

[2]Numerous studies in human resource management have analyzed the impact of increasing diffusion of the logic based on shareholder value maximization on labor relations and more specifically on labor flexibility. Thus, the implementation of shareholder primacy encourages the firms of pursuing a cost-reduction strategy of human resource management (Deakin and Rebérioux, 2009).

largely theoretically and empirically explored. Bekaert *et al.* (2006) and Eozenou (2008) suggest that countries with high levels of financial integration experience a greater reduction in consumption growth volatility. More specifically, Eozenou's (2008) results indicate that consumption growth volatility is found to increase with the degree of financial integration in countries with low level of financial development and to decrease in countries with high level of financial development. More recently, Popov (2011) finds that the effect of financial liberalization is positive on growth but at the same time financial liberalization is correlated with higher tail risk (*i.e.*, an increase in the left skewness). Stiglitz (2000) argues that capital market liberalization has not enhanced growth but rather produced higher instability on growth. A considerable amount of research effort has dealt with the implications of increasing financial development on growth or unemployment dynamics. In this article, we want to test empirically the relationship between financial development and the volatility of the employment and of wages of workers with different skills.

2.1 Financial development and labor-market volatility

A majority of theoretical and empirical papers interesting in evaluating the impact of financial globalization on labor-market finds contrasting effects. It is frequently argued by financial economists that financial development increases the risk-diversification possibilities and thus would be associated with reduced volatility. This thesis is theoretically supported by Erauskin (2011) who proposes a model for a stochastically growing small open economy in continuous time where government spending is productive. In the same vein, Bertola (2007) finds evidence of substitution, rather than complementarity, between the trade openness and financial integration in regard with government size. This finding suggests that economic globalization would decrease demand for redistribution in countries where financial markets are well developed and thus are a good substitute for government policies. In other words, better financial markets reduce the positive effect of trade openness on the size of government. In this case, financial markets allowing a better risk-diversification are not responsible for generating new risks but, on the contrary, are considered as efficient instruments to cover risks related to international competition.

By contrast, Thesmar and Thoenig (2004) demonstrate that financial development, by broadening of the pool of external investors (both at the domestic and international levels), improves risk sharing but also encourages firms to adopt more profitable and riskier strategies including for non-listed firms. Financial development has a general equilibrium effect on wages and price and also affects the strategies of the non-listed firms: this will result in an overall increase in the uncertainty of sales, employment and profits in all firms. The model also predicts that the effects of financial development are stronger when the competition on the product market is tougher. In this sense, we argue that financial development should lead to higher volatility in employment and in wages.

Another argument relates to the thesis of financial fragility: it has been often

argued that financial development has the potential to increase the likelihood of major economic crises (Saillard, 2012). In advanced as well as in emerging countries, the frequency of banking and/or financial crises and the degree of labor-market volatility have simultaneously increased since the early of the 1980s (International Institute for Labour Studies, 2008). By generating negative externalities in the whole economy, specifically in periods of financial crisis, financial development thereby may have an increasing-effect on labor-market volatility. Pagano and Pica (2012) find strong support for the thesis of 'dark side' of financial development claiming that a developed financial market amplifies the repercussions of financial crises on employment. Results seem to show that, during banking crises negative shocks disproportionately impact employment growth in financially dependent sectors in countries with more highly developed financial systems. Consequently, financial development is considered as a risk *per se* as underlined by some scholars (*e.g.* Stiglitz, 2000): as noted by Pagano and Pica (2012), "the recent events have administered a sharp reminder that the financial markets may themselves be a source of risk, rather than a mechanism to price and share it; and financial sophistication may itself be a source of instability, if it encourages excess risk-taking".

Hypothesis 1 *Financial development at the international and domestic levels is associated with an increase in labor-market volatility.*

The improved risk-diversification possibilities that offers financial development are, however, not equal among individuals. Buch and Pierdzoch (2013) find strong evidence of a positive impact of higher degree of financial integration on the volatility of hours worked, and this particularly for low-skilled workers. They propose a dynamic stochastic general equilibrium model of a small open economy: financial globalization is captured by portfolio adjustment costs, and the costs of adjusting hours worked are different between high- and low-skilled workers. The two authors show that financial globalization gives rise to an increase in the volatility of hours worked: financial globalization is associated with a rise in output volatility that may trigger more additional hires and fires of low-skilled workers than of high-skilled workers because the adjustment costs per unit of high-skilled workers are lower for high-skilled workers than for low-skilled workers. Alternatively, their results also indicate that financial globalization leads to more wage volatility with similar effects across skill groups.

In a recent paper, Pagano and Pica (2012) find that financial development at the domestic level increases the volatility of employment, *i.e.* when the cross-industry dispersion in stock returns is high (reflecting profit shocks). In other words, financial development favors labor reallocation across industries from the 'weaker' to the 'stronger' industries. As a result, if financial development is prone to increase the expected labor income for workers, it also raises its variance. Workers with high degree of risk aversion will consider that the increase in their labor income risk outweighs the benefits from an increase in expected income and will probably be

more resistant against more volatility in financial and labor markets. Because of higher risks of becoming unemployed or jobless, lower income groups are more exposed to risk than higher income groups and have thus a higher degree of risk aversion.

In addition, it is frequently claimed in the literature on earnings volatility that the access to financial assets allow households to smooth consumption: following this literature, because low-skilled and low-paid workers have poorer access to financial markets it becomes more difficult for these households to smooth consumption if they are hit by negative income shocks (OECD, 2011). However, recent analyses (Rajan, 2010) have shown that political authorities in many countries (in the first place the United States) have made easier the access to financial markets for the poorer households. In that vein, following the thesis of financial fragility, the potential negative externalities on the whole economy would be larger in times of financial crisis in highly financially developed countries. And this because financial deregulation has made easier the access to credit for low-income households and has thus increased the proportion of households owning shares and financial assets. Furthermore, as witnessed the recent financial crisis of 2007-2008, the bursting of assets bubbles may have direct impact on the economy's real sectors: the negative shock on the economy at large - and more specifically the reduction in credit availability (due to deterioration of the financial industry's intermediary function) - are more likely to affect lower wage-earners (Boyer, 2011).

To sum up, we have shown that labor-market risks are more concentrated on low-skilled workers whereas financial development should theoretically mitigate labor-market volatility for high-skilled workers because of improved possibilities of risk-sharing and of reduced consumption volatility. As a consequence, the risks on labor market being unevenly distributed across skill groups, we assume that financial development should have strong distributional effects and should more impact low-skilled workers' welfare. We propose to analyze the political-economic implications of the consequences of increased labor-market volatility.

Hypothesis 2 *Financial development at the international and domestic levels is associated with an increase in labor-market volatility, more particularly for low-skilled workers.*

2.2 Interactions between financial development and welfare state institutions

We investigate in this section the relationship between welfare state institutions and labor-market volatility. In a political-economy perspective, we argue that governments will implement specific welfare programs to compensate the negative impact of financial development on workers' welfare. Our argument is based on the 'compensation hypothesis' that stresses that increasing globalization generates new risks and thus will result in an increase in welfare state spending.

Political scientists (*e.g.* Cameron, 1978; Katzenstein, 1984 or Garrett, 1998) and economists (*e.g.*, Rodrik, 1997; 1998) analyzed the role of government faced with an

increasing instability in a more globalized world. According to the proponents of the 'compensation hypothesis', governments will continue to provide social compensation to workers who are affected by the new risks engendered by globalization.[3] The so-called 'compensation hypothesis' is based on two different mechanisms:

1. First, in reaction to this new insecure context, voters will increasingly support social protection and social insurance (political *demand*);

2. Then, in response to this political demand, governments will supply more generous welfare state programs (political *supply*);

In other words, more generous welfare programs will *compensate* globalization 'losers' for the risks associated with increased international competition and volatility.

This literature assumes that some categories of workers would be exposed to higher risks. Two different approaches are prevalent in identifying globalization winners and globalization losers (Gourevitch and Shinn, 2005; Walter, 2010). First, the *sectoral Ricardo-Viner* model that stresses the sectors' degree of exposure to global competition: workers in exposed sectors are more likely to suffer from globalization than workers in sheltered sectors. Second, the *Stolper-Samuelson model* that stresses factor endowments as central determinant: capital holders (including high-skilled workers) have comparative advantages in developed economies. In this paper, we adopt an unidimensional approach by focusing only on skill levels since data provides only information on the 'skill dimension'.

Empirically, Cameron (1978), Katzenstein (1984), Rodrik (1997; 1998), Garrett (1998) and Swank (2002) find all a positive relationship between trade openness and the size of government, and more specifically the size of the welfare state. In their seminal works, Cameron (1978) and Katzenstein (1984) find that globalization leads to welfare state expansion particularly in small countries. In this line, Rodrik (1997) finds a positive relationship between lagged exposure to trade as a share of GDP from 1980 to 1989 and government expenditures as a percentage of GDP from 1990 to 1992. Using Swiss survey data, Walter (2010) proposes to test the microfoundations of the 'compensation hypothesis' and finds out that low-skilled workers (i) are more likely to feel insecure, (ii) are more in favor of higher state involvement and then (iii) are more likely to support left-wing parties.[4] Conservely, Meinhard and Potrakfe (2012), in a recent paper, challenge the traditional view of the 'compensation hypothesis': they find no empirical evidence indicating that economic globalization increases the demand for social insurance.

[3] Iversen and Cusack (2000) challenge this view: they argue that growing insecurity does not result from increasing globalization but from the process of deindustrialization.

[4] About the relationship between insecurity feeling and partisan preferences, Guillaud (2013) finds that occupation, income and risk aversion are all shaping the individual preferences for redistribution. For instance, service workers, craftsmen, machine operators and elementary workers are more in favor of redistribution than the reference category, represented by office clerks.

More interestingly for our purpose, Fatás and Mihov (2001) find that government expenditure, through the automatic stabilizers, has a reducing-effect on output growth volatility. The automatic stabilizers can absorb the shocks associated with higher volatility and instability better (Stiglitz, 2000). In the same vein, OECD (2011) points out the importance of taxes (such as unemployment benefits and social assistance) in reducing the impact of earnings fluctuations.

Hypothesis 3 *Welfare state institutions reduce labor-market volatility when the influence of financial markets at the international and domestic levels becomes larger.*

By contrast, as underlined above, Erauskin (2011) argues that the role of government in the mitigation of volatility is lower in an economy without restrictions on capital account because financial development is associated with a better risk-diversification. Carmignani *et al.* (2011) find that higher volatility is associated with larger government size but with a destabilizing effect. Overall, all these results suggest that financial development cannot be considered as a risk factor but seems rather to discipline government size. From this perspective, and in line with Bertola's (2007) argument, welfare state institutions would have no impact on labor-market volatility when the influence of the financial markets becomes larger.

3 Data and trends

3.1 Measuring labor-market volatility

More volatile labor markets should reflect more dynamic and innovative markets that encourage the reallocation of labor (Pagano and Pica, 2012). In that sense, labor market volatility reflects a large dispersion of productivity/profitability across industries. On the other hand, an increase in the volatility on labor markets is also closely related to an increase in the dispersion of the level of earnings across workers. Following the methodology used by Rodrik (1997; 1998), we measure the degree of instability on labor markets by computing the volatility of hours worked (as a proxy for instability in employment) and the volatility of wages (reflecting the instability in earnings).

To obtain a measure of labor-market volatility, we use the EU KLEMS Database from the OECD that provides data on total hours workers by persons engaged and total labor compensation by skill groups (*HS* for high-skilled workers and *LS* for low-skilled workers) from 1970 to 2005.[5] We use two measures of labor-market volatility (See Appendix A for the construction of these two measures).

Figures 1 and 2 plot labor-market volatility, distinguishing labor-market volatility by skill groups. Table 1 also provides summary statistics on the level of labor-market volatility by decade and by skill group.

[5] All data are available on the website: www.euklems.net.

[INSERT TABLE 1 ABOUT HERE]

Figure 1 as well as Table 1 reveal some differences in the level of volatility of hours worked by skill groups. One can see important cross-national variations in levels and in trends: Continental European countries (such as France, Germany, Netherlands or Belgium) have experienced low and stable volatility of hours worked. However, some Anglo-Saxon countries (such as Australia, Ireland, the United Kingdom and to a lesser extent the United States) have higher variations in volatility. Interestingly, Northern European countries (such as Finland and Sweden) as well as Spain are closer to the Anglo-Saxon countries than to the first category of countries. It is striking that in some countries (*i.e.*, Italy, the Netherlands, the United Kingdom or the United States) low-skilled workers have been particularly confronting to increasing volatility than other categories of workers. This trend is compatible with our argument that financial development has mainly affected low-skilled workers.

As regards the volatility of wages, most of the countries in our sample have experienced greater volatility of wages than the volatility of hours worked (Table 1). Volatility of wages reached a peak during the 1980s and is decreasing since then but with relatively high levels of volatility. About differences across skill groups, one finds that the volatility of wages for low-skilled workers is slightly higher than high-skilled workers (Figure 2). There is much less cross-national variations in the volatility of wages: as indicated in Table 1, most of the OECD countries (excluding the United States that presents very stable levels of volatility) experienced an increase in the volatility of wages during the 1980s and show similar patterns.

[INSERT FIGURES 1 AND 2 ABOUT HERE]

3.2 Data on financial development and welfare state institutions

Our main explanatory variables are proxies for the degree of international integration of financial markets and the degree of development of the domestic financial system. First, to capture the *international dimension* of financial development, we use a common measure of international financial integration provided by Lane and Milesi-Ferretti (2007): *total assets and liabilities over GDP*.[6] External assets and liabilities are including (i) portfolio investment (subdivided into equity securities and debt securities), (ii) foreign direct investment that refers to equity participations above 10%, (iii) financial derivatives and (iv) reserve assets. Second, to capture the *domestic dimension* of financial development, we use one measure of domestic financial development: the *stock market capitalization ratio to GDP*. The *stock market capitalization* ratio gives a measure of stock market activity, *i.e.* to what extent the stock market can efficiently allocate capital to investment projects. It is assumed that a more developed financial market also increases the investors' opportunities for risk diversification.

[6]Data are freely available on Philip R. Lane's website: http://www.philiplane.org/EWN.html

Consequently, this indicator reflects the capacity of stock markets to provide external financing.

To account for welfare state institutions, we use the overall social security expenditure as a percentage of GDP, taken from Armingeon *et al.* (2012), which is a very standard indicator for a country's effort in social protection. This variable is including social assistance grants and welfare benefits paid by general government (benefits for sickness, old-age, family allowances, ...). Database on public social expenditure and revenue data is freely downloaded from OECD National Accounts Statistics.

3.3 Control variables

Our choice of control variables is in line with the existing literature. To consider Rodrik's (1997; 1998) argument that trade openness increases wage elasticity of firms, and thus increases labor-market volatility, particularly for low-skilled workers, we compute the sum of imports and exports as a percentage of GDP (*Trade openness*). Because low-skilled workers have higher risks of becoming unemployed or jobless and with more persistent periods of unemployment, we control for unemployment rates as a determinant of labor-market volatility. We use the OECD time series on standardized unemployment rates (*Unemployment rate*). Data on trade openness and unemployment rate is provided by Armingeon *et al.* (2012). Finally, we control for macroeconomic volatility that is expected to impact labor markets and then to increase their volatility. We calculate the volatility of output growth by computing the rolling standard deviation for growth rates of real GDP over a five-year-window (*Volatility of output growth*).

Our sample is composed of 15 OECD countries (Australia, Austria, Belgium, Denmark, Finland, France, Germany, Ireland, Italy, Japan, Netherlands, Spain, Sweden, United Kingdom and United States). Table A.1 in Appendix displays descriptive statistics for the variables used in the regressions.

The aim of this paper is to analyze the impact of financial development on labor-market volatility. More specifically, we want to test the argument that the impact of financial development on the labor-market volatility is conditional to specific welfare state institutions. We introduced one interactive term between financial development and welfare state institutions. We will estimate the following relationship:

$$\sigma(y_{it}) = \beta_0 + \beta_1 \cdot FIN_{it} + \beta_2 \cdot SPEND_{it} + \beta_3 \cdot FIN_{it} \cdot SPEND_{it} + \beta_k \cdot \Sigma_k X_{k,it} + \mu_t + \mu_i + \epsilon_{it} \quad (1)$$

where $\sigma(y_{it})$ denotes rolling standard deviation for growth rates of hours worked (or of wages) over a five-year-window, FIN_{it} the variable capturing financial development, $SPEND_{it}$ the variable capturing the social security transfers as a percentage of GDP, μ_t country fixed effects, μ_i time fixed effects, $\sum_k X_{k,it}$ a set of control variables, and ϵ_{it} an error term.

In this article, we want to explore whether governments will react to fluctuations on labor-market by increasing social security expenditure. Our principal argument is based on the idea that the more financially developed a country is, the more governments will play an active role in compensating negative externalities associated with increasing financial development. In other words, the effect of welfare state institutions on labor-market volatility is *conditional* on specific levels of financial development, as expressed as follows:

$$\frac{\partial \sigma(y_{it})}{\partial SPEND_{it}} = \widehat{\beta_2} + \widehat{\beta_3} \cdot FIN_{it} \tag{2}$$

In Equation (1), the coefficient β_1 can be interpreted as the effect of the social security transfers on labor-market volatility but when FIN_{it} equals zero. [7]

Accordingly, the t values obtained from an interactive model indicate the effect of an independent variable on the dependent variable but depending on *particular* levels of another independent variable: hence, it is not surprising that insignificant variables can produce significant marginal effects (Friedrich, 1982).

Thanks to a specific STATA procedure, we report marginal effects of the social security transfers at different sample values of financial variables (minimum, mean minus one standard deviation, mean, mean plus one standard deviation, maximum).

We begin by using a simple fixed effect panel data model with a panel corrected standard errors (PCSE) estimator provided by Beck and Katz (1995). Before running regressions, we run unit root tests to check whether our variables are stationary or not.We find that our variables in levels are stationary, sometimes with a drift. Then, we are able to use the ordinary least squares (OLS) with Beck and Katz's (1995) panel corrected standard errors (PCSE) as homoskedasticity and indepedence of errors are not verified. Finally, we find that the data does not have first-order autocorrelation. Then, we address the issue of reverse causality by running IV-GMM estimations: welfare state institutions can be endogenous to economic conditions: as noted by Rodrik (1998) and Fatás and Mihov (2001), governments should be capable of stabilizing labor-market fluctuations if such economies are more volatile. In order to take into account the effect of labor-market volatility on social security expenditure, and hence to address the endogeneity problem of the welfare state variable, we run instrumental-variable (IV) regressions. Here are considered as endogenous variables the welfare state variable as well as the interactive term between welfare state variables and our financial variables.

[7] Determining the significance of the effect of $SPEND_{it}$ on $\sigma(y_{it})$ conditional on FIN_{it} values, we compute the standard error of the sum $(\beta_1 + \beta_3 \cdot FL_{it})$ as follows:

$$se_{(\widehat{\beta_1}+\widehat{\beta_3}\cdot FIN_{it})} = \sqrt{var\left(\widehat{\beta_1}\right) + FIN_{it}^2 \cdot var\left(\widehat{\beta_3}\right) + 2FIN_{it} \cdot cov\left(\widehat{\beta_1}\widehat{\beta_3}\right)} \tag{3}$$

But finding good instruments is always a difficult task.[8] On the basis on theoretical considerations and empirical analysis, we choose several instruments. First, we want to test the argument that economic and financial globalization may have gradually contributed to the reduction in the governments' ability to finance generous welfare programs in accordance with the 'efficiency hypothesis'. Accordingly, globalization has created new constraints on public budgets what would be associated with a 'welfare retrenchment' or what Pierson (2001) called the 'era of austerity'. So, we include as first instruments several variables related to the budgetary situation in the economy all provided by Armingeon *et al.* (2010): adjusted annual deficit, total receipts of general government/GDP, long-term interest rate on governments bonds, and gross government debt/GDP. Then, we seek to investigate the specific determinants of social security expenditure: we include in our regressions cyclical economic variables (*i.e.*, real GDP growth, and current account balance/GDP), structural economic variable (*i.e.*, total population), institutional variables (*i.e.*, net unemployment replacement rates, trade union density rate and financial openness index from Chinn and Ito, 2008) and finally political economy variables (government ideological orientation, Rae's index of electoral fractionalization of the party-system, political voting system, political regime, and Herfindahl index of political competition).[9]

Finally, we submit those instruments to a series of tests to confirm its validity: for the first test, we never reject the null hypothesis that our overidentifying restrictions are correct. For the other tests, we always reject the null hypothesis of non-significance not suggesting the existence of any problems with our instrumentation.

4 Estimation results

The regression results when using volatility of hours worked growth as dependent variable are reported in Tables 2. Each financial variable is regressed against our two dependent variables for high-skilled [HS] workers and for low-skilled [LS] workers. Focusing on the impact of financial variables, our results indicate a positive and significant relationship between our dependent variable and our two financial variables: financial development at the international and domestic levels is associated with higher volatility of hours workers. We find as expected that the impact is larger and statistically significant for low-skilled workers. Very surprisingly, we do not find a differentiated effect of financial development on the dependent variable across skill groups. Financial development is also associated with an increase in the volatil-

[8] See Angrist and Pischke (2009) for a full discussion.

[9] Fiscal data, and total population, trade union density rate, Rae's index of electoral fractionalization of the party-system, political regime and political voting system are provided by Armingeon *et al.* (2010); current account balance/GDP is found in the Word Bank Indicators database; net unemployment replacement rates are provided by Caminada and Van Vliet (2012); government ideological orientation is an extended version of the index proposed by Amable *et al.* (2006) and the Herfindahl index of political competition is given from the Database of Political Institutions.

ity of hours workers for high-skilled workers but the coefficient is not statistically significant.

Then, focusing on the welfare state variable, we find a strong reducing effect of government size on the volatility of hours worked. More interestingly, to account for the complementarity or substituability effects between welfare state institutions and financial development, we compute marginal effects for specific levels of each financial variable. One can see that the marginal effect is decreasing with the level of financial variables. These results seem to support the 'compensation hypothesis': social security expenditure significantly contributes to the reduction in the volatility of hours worked as financial development is increasing at the domestic and international levels. Using the PCSE/OLS estimator, we find that the compensation effect is larger for high-skilled workers. By contrast, as expected, we do find, when using the IV-GMM estimator, a larger and statistically significant effect for low-skilled workers who are more affected by the turbulences on the labor market. Controlling for endogeneity in the IV-GMM regressions allows us to deal with the simultaneity bias between our dependent variable and the welfare state variable. In addition, one should remark that the size of the coefficients associated with our several financial variables and with the marginal effects are slightly higher than the coefficients found in the first regressions using PCSE/OLS method in models (5) to (8). This finding might suggest that, contrary to the 'efficiency thesis', financial integration which may be associated with higher budgetary discipline will not lead to a reduction in the governments' ability of cushioning labor-market fluctuations.[10]

Among control variables, we find that unemployment and volatility of output growth are both correlated with an increase in the standard deviation of hours worked growth. However, results associated with trade openness are not statistically robust.[11]

[INSERT TABLE 2 ABOUT HERE]

We run similar regressions using the volatility of wages growth as dependent variable (Table 3). As expected, we find that the volatility of wages and our different measures of financial development are all positively correlated. But, surprisingly, we find that high-skilled workers are sightly more affected by an increase in volatility of wages than low-skilled workers except in models (3) and (4) for the international dimension of financial development. This result contrasts with Buch and Pierdzioch

[10]Results from first-stages (not shown) indicate a negative and significant coefficient between social security expenditure and fiscal cyclical variables.

[11]Moreover, finding a highly significant coefficient in models including proxies for international financial integration raises the risk of multicollinearity between trade openness and total assets plus liabilities over GDP. Regressions by dropping the variable of trade openness give similar results.

(2013) who find that the effect of financial globalization on the volatility of wages is roughly the same for high- and low-skilled workers.

How should we explain that high-skilled workers are more affected by the financial development at the domestic dimension (models (7) and (8))? The more frequent use of performance-related pay (PRP) and other incentive devices by top managers and high-skilled workers may result in the increase in the earnings volatility (OECD, 2011). Moreover, Thesmar and Thoenig (2004) show that the development of financial markets increases the uncertainty on employment and profits. These specific earnings schemes, such as PRP and other incentive devices, are indexed on the firms' profits (Boyer, 2005) making the wages of high-skilled workers more volatile.

Very surprisingly, we find that higher social security expenditure is associated with an increase in the volatility of wages. This result is in line with the argument of Carmignani *et al.* (2011) claiming that government would have a destabilizing effect on macroeconomic volatility. However, if we look at the marginal effects, one can see that the marginal effect of social security expenditure on the volatility of wages is decreasing with the level of financial integration at the international and domestic levels. As expected, we find a larger compensation effect for low-skilled workers than high-skilled workers in the face of financial globalization (models (3) and (4)). However, we find, including in the IV-GMM regressions, a larger compensation effect of welfare state institutions for high-skilled workers than low-skilled workers in the face of the development of the financial markets at the domestic level.

Among control variables, we find that only unemployment rate has a positive and significant influence on our dependent variable. Trade openness and macroeconomic volatility give insignificant coefficients.

[INSERT TABLE 3 ABOUT HERE]

5 Conclusion

The aim of this paper was to assess the consequences of increasing financial development on labor-market instability and to explore the role of welfare state institutions in the face of a more unstable environment. Based on the theory of financial fragility (Keynes, 1936; Minksy, 1986; Aglietta and Rebérioux, 2005), we provide in this paper evidence of a positive relationship between the expansion of financial markets and the instability on labor markets. Empirical work has shown that macroeconomic volatility decreased during the 1980s and the 1990s suggesting a new era of low risks and high returns ('Great Moderation'). Financial development, by contrast, has not contributed to a risk reduction on labor markets, and this despite improved possibilities of risk-diversification.

Thus, our analysis on panel data shows that financial development is quite associated with higher labor-market instability measured by the volatility of hours

worked and the volatility of wages. Controlling for potential reverse causality between our dependent variables and welfare state institutions, we find that this impact is higher for low-skilled workers than for high-skilled workers. More specifically, results clearly indicate that low-skilled workers are more affected by higher volatility of hours worked. Results are, however, less robust on the impact on the volatility of wages when controlling or not for potential reverse causality.

One major contribution of this paper is to analyze the interdependency across financial development and welfare state institutions: we find that welfare state institutions measured by social security transfers as a percentage of GDP contribute to the reduction in labor-market volatility. Furthermore, our results suggest that this impact is conditional to the degree of financial exposure: the more financially developed an economy, the more social security expenditure has a reducing-effect on labor-market volatility. This result seems support the 'compensation hypothesis': higher financial development may increase the insecurity feeling, more particularly for low-skilled workers who will support more generous welfare programs. Governments therefore continue to provide ample compensations to their constituency, and this although growing globalization and tax competition would have made more difficult for governments to finance generous welfare programs. These findings challenge the 'efficiency hypothesis' considering that welfare state institutions, because they are financially unsustainable, need to be reformed. Saint-Paul (2000) argues that 'suboptimal' institutions can be resilient if they rely on a solid political base.

This paper provides a political-economy explanation of complementarities between financial development on the one hand and welfare state institutions on the other hand. The evidence of the 'compensation hypothesis' indicates that financial development has not reduced but increased government involvement in providing specific compensation mechanisms. Beyond increased volatility of hours worked and of wages, Rodrik (1997) predicts that globalization may also have caused an increase in the dispersion of earnings among low-skilled workers. Darcillon (2012) proposes to analyze the relationship between financial development at the domestic level and wage inequality. More specifically, we show that financial development is associated with higher wage inequality particularly in countries with weak labor labor market institutions. In line with our present research, Breen and García-Peñalosa (2005) find a strong correlation between macroeconomic volatility and income inequality measured by the Gini coefficient. In other words, countries where output is very volatile are also more unequal.

Bibliography

Aglietta, M., and Rebérioux, A. 2005. *Corporate governance adrift. A critique of shareholder value*, Cheltenham, Edward Elgar

Amable, B., Gatti, D., and Schumacher, J. 2006. Welfare-State Retrenchment: The Partisan Effect Revisited, *Oxford Review of Economic Policy*, vol. 22, no. 3, 426-44.

Angrist, J.D., and Pischke, J-S. 2009. *Mostly Harmless Econometrics*, Princeton, Princeton University Press.

Armingeon, K., Potolidis, P., Gerber, M., and Leimgruber, P. 2012. Comparative Political Data Set I 1960-2010, Institute of Political Science, University of Berne.

Baum, C.F., Schaffer, M.E., and Stillman, S. 2007. Enhanced routines for instrumental variables/GMM estimation and testing? *Stata Journal*, vol. 7, no. 4, 465-506.

Beck, T., Demirgüç-Kunt, A., and Levine, R. 2010. A New Database on Financial Development and Structure. Washington. World Bank.

Beck, N., and Katz, J.N. 1995. What To Do (and Not To Do) with Times-Series-Cross-Section Data in Comparative Politics? *American Political Science Review*, vol. 89, no. 3, 634-47.

Bekaert, G., Harvey, C.R., and Lundblad, C. 2006. "Growth volatility and financial liberalization", *Journal of International Money and Finance*, vol. 25, no. 3, 370-403.

Bertola, G. 2007. Finance and Welfare States in Globalising Markets, pp. 167-195 in Kent, C. and Lawson, J. (eds), *The Structure and Resilience of the Financial System*, Sydney, Federal Reserve Bank of Australia.

Boyer, R. 2011. *Les financiers détruiront-ils le capitalisme ?*, Economica. Paris.

Breen, R., and García-Peñalosa, C. 2005. Income Inequality and Macroeconomic Volatility: An Empirical Investigation, *Review of Development Economics*, vol. 9, no. 3, 380-98.

Buch, C.M., and Pierdzioch, C. 2013, Labor Market Volatility, Skills, and Financial Globalization, *Macroeconomic Dynamics*, forthcoming.

Cameron, D. 1978. The Expansion of the Public Economy, *American Political Science Review*, vol. 72, no. 4, 1243-61.

Caminada, K., and Van Vliet, O. 2012. Unemployment Replacement Rates Dataset among 34 Welfare States, 1971-2009. An update, extension and modification of the Scruggs' Welfare State Entitlements Data Set, *NEUJOBS Special Report No.2*.

Capelle-Blancard, G. 2009. Les marchés dérivés sont-ils dangereux?, *Revue Economique*, vol. 60, no. 1, 157-72.

Carmignani, F., Colombo, E., and Tirelli, P. 2011. Macroeconomic risk and the (de)stabilising role of government size, *European Journal of Political Economy*, vol. 27, no. 4, 781-90.

Darcillon, T. 2012. Do Interactions between Finance and Labor Market Institutions Affect Wage Distribution?, *CES Working Paper*, No. 2012.89, December.

Deakin, S., and Rebérioux, A. 2009. Corporate governance, labour relations and human resource management in Britain and France: convergence or divergence?, pp. 127-50 in Touffut, J-P. (ed), *Does Company Ownership Matter?*, Edward Elgar Publishing, Cournot Centre, Paris, France

Eozenou, P. 2008. Financial Integration and Macroeconomic Volatility: Does Financial Development Matter?, *MPRA Paper*, No. 12738, University Library of Munich, Germany, September.

Erauskin, I. 2011. Financial openness, volatility, and the size of productive government, *SERIEs*, vol. 2, no. 2 , 233-53

Fatás, A., and Mihov, I. 2001. Government size and automatic stabilizers: international and intranational evidence, *Journal of International Economics*, vol. 55, no. 1, 3-28.

Friedrich, R. 1982. In Defense of Multiplicative Terms in Multiple Regression Equations, *American Journal of Political Science*, vol. 26, no. 4, 797-833.

Garrett, G. 1998. Partisan Politics in the Global Economy, Cambridge, Cambridge University Press.

Gourevitch, P.A., and Shinn, J. 2005. Political Power and Corporate Control: The New Global Politics of Corporate Governance, Princeton, Princeton University Press.

Griliches, Z. 1969. Capital-skill complementarity, *Review of Economics and Statistics*, vol. 51, no. 4, 465-68.

International Institute for Labour Studies. 2008. *World of Work Report 2008: Income inequalities in the age of financial globalization* [Electronic version]. Geneva: International Labour Organization.

Iversen, T., and Cusack, T.R. 2000. The Causes of Welfare State Expansion. Deindustrialization or Globalization?, vol. 52, 313-49.

Jayadev, A. 2007. Capital account openness and the labour share of income, *Cambridge Journal of Economics*, vol. 31, no. 3, 423-43.

Katzenstein, P. 1985. *Small States in World Markets: Industrial Policy in Europe*, Ithaca, NY, Cornell University Press.

Keynes, J.M. 1936. *The General Theory of Employment Interest and Money*. London: Macmillan. Reprinted in *The Collected Writings of John Maynard Keynes*, vol. VII. London: Macmillan for the Royal Economic Society, 1973.

Lane, P.R., and Milesi-Ferretti, G.M. 2007. The external wealth of nations mark II: Revised and extended estimates of foreign assets and liabilities, 1970-2004, *Journal of International Economics*, vol. 73, no. 2, 223-50.

Meinhard, S., and Potrafke, N. 2012. The Globalization-Welfare State Nexus Reconsidered, *Review of International Economics*, vol. 20, no. 2, 271-87.

Minsky, H. 1986. *Stabilizing an Unstable Economy*. McGraw-Hill Professional.

OECD, 2007. OECD Workers in the Global Economy: Increasingly Vulnerable?, *OECD Employment Outlook 2007*, OECD Publishing, Paris.

OECD, 2011. Earnings Volatility: Causes and Consequences, *OECD Employment Outlook 2011*, OECD Publishing, Paris.

Orléan, A. 2009. *De l'euphorie à la panique : penser la crise financière*, Cepremap, Editions Rue d'Ulm/Presses de l'Ecole normale supérieure.

Pagano, M., and Pica, G. 2012. Finance and employment, *Economic Policy*, vol. 27, no. 69, 5-55.

Pierson, P. 2001. Coping with Permanent Austerity: Welfare State Restructuring in Affluent Democracies, pp. 410-56 in Pierson, P. (ed), *The New Politics of the Welfare State*, Oxford, Oxford University Press

Popov, A.A. 2011. Financial Liberalization, Growth, and Risk, *Working Paper*, January.

Rodrik, D. 1997. *Has Globalization Gone Too Far?* Washington, D.C., Institute for International Economics.

Rodrik, D. 1998. Why Do More Open Economies Have Bigger Governments?, *Journal of Political Economy*, vol. 106, no. 5, 997-1032.

Saillard, A. 2012. The Role of Complementarity and the Finance Liberalization in the Financial Crisis, *CES Working Paper*, No. 2012.38, June.

Saint-Paul, G. 2000. *The Political Economy of Labour Market Institutions*, Oxford, Oxford University Press.

Stiglitz, J.E. 2000. Capital Market Liberalization, Economic Growth, and Instability, *World Development*, vol. 28, no. 6, 1075-86.

Swank, D. 2002. *Global Capital, Political Institutions, and Policy Change in Developed Welfare States*, New York, Cambridge University Press.

Thesmar, D., and Thoenig, M. 2004. Financial Market Developments and The Rise in Firm Level Uncertainty, *CEPR Discussion Paper*, No. 4761.

Walter, S. 2010. Globalization and the Welfare State: Testing the Microfoundations of the Compensation Hypothesis, *International Studies Quarterly*, vol. 54, no. 2, 403-26.

Appendix 1: Construction of data

To obtain a measure of labor-market volatility, we use the EU KLEMS Database from the OECD that provides data on total hours workers by persons engaged and total labor compensation by skill groups (*HS* for high-skilled workers and *LS* for low-skilled workers) from 1970 to 2005.[12] We use two measures of labor-market volatility:

- ***Hours worked***: We calculate hours worked h_{fit} for each skill level f (with $f = \{HS; LS\}$) in country i for the year t:

$$h_{fit} = H\_EMP_{it} \times (H_{fit}/100) \tag{4}$$

  with H_EMP_{it} denoting the total hours worked by persons engaged and H_{fit} the share in total hours worked by the group of workers f (high-, or low-skilled workers);

[12] All data are available on the website: www.euklems.net.

- ***Average wages***: We calculate average wages w_{fit} for each skill level f (with $f = \{HS; LS\}$) in country i for the year t:

$$w_{fit} = \frac{LAB_{it} \times (LAB_{fit}/100)}{h_{fit}} \tag{5}$$

with LAB_{it} denoting labor compensation converted into constant US dollar (by using the exchange rate series from the Penn World Tables and by deflating by the U.S. output price index) and LAB_{fit} the share in total labor compensation to the group of workers f (high-, low-skilled workers);

By using these data, we obtain respectively the growth rate of hours worked and wages. We compute the rolling standard deviation for growth rates over a five-year-window:

$$\sigma(y_{it}) = \frac{1}{5}\sqrt{\sum_{k=0}^{4}\left(y_{i,t+k} - \bar{y}_{t+k}\right)^2} \tag{6}$$

where y_{it} is the growth rates of hours workers and of wages and $\bar{y}_{t+k}$ is the corresponding mean.

Appendix 2: Descriptive statistics

Table A.1: *Summary statistics*

Variables	Mean	Std. Dev.	Min.	Max.	N
Volatility of hours worked					
High skill	0.023	0.018	0.000	0.100	437
Low skill	0.022	0.022	0.001	0.157	437
Volatility of wages					
High skill	0.102	0.050	0.010	0.241	362
Low skill	0.106	0.050	0.017	0.235	362
Total assets plus liabilities/GDP	2.138	2.718	0.184	25.731	570
Debt assets plus liabilities/GDP	1.400	1.751	0.075	17.249	570
Stock market capitalization/GDP	0.697	0.431	0.056	2.659	278
Stock market value traded/GDP	0.595	0.633	0.012	3.785	294
Financial Reforms index	14.875	5.351	2.00	21.00	495
Social Expenditures/GDP	13.926	3.896	3.49	23.66	570
Trade openness	62.524	34.628	11.25	181.63	570
Unemployment rate	6.933	4.107	0.570	24.17	570
Volatility of output growth	1.634	0.843	0.178	5.092	510

Table 1: *Labor-market volatility (by decade and skill group)*

Variables	1970-1979		1980-1989		1990-1990		2000-2007	
	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.
Hours worked volatility	0.013	0.008	0.011	0.0066	0.013	0.007	0.008	0.003
High skill	0.017	0.001	0.022	0.016	0.025	0.017	0.022	0.022
Low skill	0.020	0.009	0.016	0.016	0.023	0.019	0.027	0.030
Wages volatility	0.077	0.031	0.123	0.058	0.097	0.04	0.083	0.033
High skill	0.077	0.034	0.134	0.065	0.098	0.039	0.082	0.032
Low skill	0.080	0.030	0.136	0.062	0.100	0.039	0.089	0.039

Table 2: *Impact of financial development on standard deviation of hours worked growth*

	HS	LS	HS	LS	HS	LS	HS	LS
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Total assets plus liabilities/GDP	0.0025	0.0032**	0.0058	0.0304***	0.0101	0.0351**	0.0340	0.1601***
	(0.0016)	(0.0015)	(0.0039)	(0.0069)	(0.0094)	(0.0148)	(0.0328)	(0.0525)
Stock Market Capitalization/GDP					-0.0033***	-0.0039***	-0.0035***	-0.0003
					(0.0009)	(0.0015)	(0.0011)	(0.0018)
Social expenditures/GDP	-0.0031***	-0.0033***	-0.0026***	0.0010	-0.0003	-0.0030***	-0.0022	-0.0116***
	(0.0006)	(0.0010)	(0.0009)	(0.0014)	(0.0007)	(0.0009)	(0.0024)	(0.0039)
Total assets × Social exp.	-0.0003**	-0.0002	-0.0007**	-0.0026***				
	(0.0001)	(0.0002)	(0.0004)	(0.0006)				
Stock market cap. × Social exp.					-0.0003	-0.0030***	-0.0022	-0.0116***
					(0.0007)	(0.0009)	(0.0024)	(0.0039)
Trade openness	0.0002*	-0.0001	0.0002	0.0011***	-0.0001	-0.0003	-0.0002**	0.0003
	(0.0001)	(0.0002)	(0.0002)	(0.0003)	(0.0002)	(0.0002)	(0.0001)	(0.0002)
Unemployment rate	0.0016***	0.0020***	0.0010***	0.0022***	0.0013***	0.0023***	0.0017***	0.0033***
	(0.0005)	(0.0006)	(0.0004)	(0.0006)	(0.0005)	(0.0008)	(0.0005)	(0.0008)
Volatility of output growth	0.0031***	0.0030**	0.0057***	0.0050**	0.0061***	0.0058***	0.0062***	0.0025
	(0.0010)	(0.0015)	(0.0015)	(0.0024)	(0.0014)	(0.0018)	(0.0018)	(0.0030)
Constant	0.0267*	0.0496**			0.0437**	0.0893***		
	(0.0138)	(0.0214)			(0.0204)	(0.0323)		
Marginal effects of social security expenditures conditional to financial level								
Min	-0.0032***	-0.0033***	-0.0023***	-0.0011	-0.0033***	-0.0040***	-0.0036***	-0.0009
	(0.0006)	(0.0010)	(0.0008)	(0.0015)	(0.0009)	(0.0015)	(0.0009)	(0.0016)
Mean_less_sd	-0.0029***	-0.0032***	-0.0016*	0.0004	-0.0033***	-0.0047***	-0.0041***	-0.0033***
	(0.0006)	(0.0010)	(0.0010)	(0.0018)	(0.0009)	(0.0015)	(0.0007)	(0.0012)
Mean	-0.0038***	-0.0037***	-0.0042***	-0.0052***	-0.0035***	-0.0060***	-0.0050***	-0.0083***
	(0.0007)	(0.0011)	(0.0006)	(0.0018)	(0.0011)	(0.0017)	(0.0011)	(0.0017)
Mean_plus_sd	-0.0046***	-0.0043***	-0.0068***	-0.0109***	-0.0036***	-0.0073***	-0.0059***	-0.0133***
	(0.0010)	(0.0013)	(0.0013)	(0.0022)	(0.0013)	(0.0018)	(0.0020)	(0.0032)
Max	-0.0122***	-0.0085**	-0.0268***	-0.0547***	-0.0041*	-0.0189***	-0.0092*	-0.0311***
	(0.0039)	(0.0043)	(0.0084)	(0.0151)	(0.0022)	(0.0029)	(0.0056)	(0.0091)
Observations	437	437	278	278	278	278	278	278
R-squared	0.4610	0.4108	-	-	0.5494	0.4777	-	-
Fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Estimator	PCSE/OLS	PCSE/OLS	IV-GMM	IV-GMM	PCSE/OLS	PCSE/OLS	IV-GMM	IV-GMM
Hansen J-statistic (p-value)	-	-	0.1108	0.2981	-	-	0.4951	0.9078
Kleibergen-Paap LM χ^2-statistic (p-value)	-	-	0.0000	0.0000	-	-	0.0000	0.0001
Anderson-Rubin χ^2 test (p-value)	-	-	0.0000	0.0000	-	-	0.0000	0.0000
Anderson-Rubin F-test (p-value)	-	-	0.0050	0.0050	-	-	0.0009	0.0009
Kleibergen-Paap LM F-statistic	-	-	2.300	2.300	-	-	5.277	5.277

Note: (Panel corrected) standard errors in parentheses; * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$;
HS = high-skilled workers and LS = low-skilled workers

Endogenous variables: Social expenditures/GDP, Total assets × Social exp.

Instruments: Social expenditures/GDP (lag), adjusted annual deficit/GDP, total receipts of general government/GDP, long-term interest rate on government bonds, gross government debt/GDP, real GDP growth, current account balance/GDP, total population, net unemployment replacement rate, trade union density rate, financial openness index, government ideological orientation, Rae's index of electoral fractionalization of the party-system, political voting system, political regime, Herfindahl index of political competition

STATA provides different tests: (1) Overidentifying restrictions (Sargan-Hansen-J statistic): the null hypothesis of this first test is that the instruments are valid instruments, *i.e.*, uncorrelated with the error term, and that the excluded instruments are correctly excluded from the estimated equation. If the null is not rejected, the overidentification restrictions are valid; (2) Underidentification test (Kleibergen-Paap LM statistic): the underidentification test is relevant to verify whether the equation is quite identified: in this case, instruments are relevant in the sense that they are correlated with assumed endogenous regressions. The null hypothesis cannot be rejected; (3) Endogenous regressors tests (Anderson-Rubin χ^2 test and Anderson-Rubin F-test): the Anderson-Rubin tests are tests of the significance of endogenous regressors in the structural estimated equation: the null hypothesis tested is that the coefficients of the endogenous regressors in the structural equation are jointly equal to zero; (4) Weak-identification test (Kleibergen-Paap F-statistic or Cragg-Donald): the Kleibergen-Paap (or Cragg-Donald) test of the weak-instruments problem that arises when the correlations between the endogenous regressors and the excluded instruments are nonzero but small. The null hypothesis is that the estimator is weakly identified in the sense that it is subject to bias that the investigator finds unacceptably large. To be able to reject the null that the size of the test is unacceptably large the Cragg-Donald F-statistic must exceed the tabulated critical value. See Baum *et al.* (2007) for more details on testing the relevance and validity of instruments.

Table 3: *Impact of financial development on standard deviation of wages growth*

	HS	LS	HS	LS	HS	LS	HS	LS
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Total assets plus liabilities/GDP	0.0120***	0.0090***	0.0272***	0.0355***				
	(0.0021)	(0.0024)	(0.0072)	(0.0120)				
Stock Market Capitalization/GDP					0.1149***	0.0977***	0.4186***	0.3640***
					(0.0231)	(0.0201)	(0.1099)	(0.1131)
Social expenditures/GDP	0.0045***	0.0043***	0.0045**	0.0076***	0.0061***	0.0064***	0.0138***	0.0143***
	(0.0010)	(0.0010)	(0.0022)	(0.0027)	(0.0011)	(0.0012)	(0.0040)	(0.0041)
Total assets × Social exp.	-0.0014***	-0.0012***	-0.0027***	-0.0035***				
	(0.0003)	(0.0003)	(0.0008)	(0.0013)				
Stock market cap. × social exp.					-0.0070***	-0.0055***	-0.0314***	-0.0273***
					(0.0015)	(0.0014)	(0.0079)	(0.0080)
Trade openness	0.0005*	0.0004	-0.0011**	-0.0007	0.0003	0.0003	-0.0008*	-0.0004
	(0.0003)	(0.0003)	(0.0005)	(0.0007)	(0.0004)	(0.0003)	(0.0004)	(0.0004)
Unemployment rate	0.0036***	0.0032***	0.0045***	0.0044***	0.0033***	0.0022**	0.0053***	0.0026
	(0.0009)	(0.0010)	(0.0012)	(0.0015)	(0.0011)	(0.0010)	(0.0017)	(0.0018)
Volatility of output growth	0.0007	0.0040	-0.0105***	-0.0094***	0.0025	0.0086**	-0.0102*	-0.0024
	(0.0023)	(0.0027)	(0.0029)	(0.0031)	(0.0029)	(0.0035)	(0.0054)	(0.0055)
Constant	-0.0138	0.0152	-	-	-0.0602*	-0.0557		
	(0.0280)	(0.0258)	-	-	(0.0352)	(0.0356)		
Marginal effects of social security expenditures conditional to financial level								
Min	0.0042***	0.0041***	0.0040*	0.0070***	0.0057**	0.0060***	0.0112***	0.0127***
	(0.0010)	(0.0010)	(0.0021)	(0.0026)	(0.0010)	(0.0011)	(0.0036)	(0.0037)
Mean_less_sd	0.0053***	0.0050***	0.0061**	0.0096***	0.0042***	0.0049***	0.0054**	0.0070***
	(0.0010)	(0.0010)	(0.0025)	(0.0033)	(0.0009)	(0.0010)	(0.0024)	(0.0026)
Mean	0.0015	0.0017*	-0.0012	0.0002	0.0012	0.0025***	-0.0081***	-0.0047
	(0.0009)	(0.0009)	(0.0017)	(0.0019)	(0.0011)	(0.0009)	(0.0029)	(0.0031)
Mean_plus_sd	-0.0023*	-0.0015	-0.0085***	-0.0093**	-0.0018	0.0002	-0.0217***	-0.0165***
	(0.0013)	(0.0015)	(0.0029)	(0.0045)	(0.0015)	(0.0012)	(0.0058)	(0.0061)
Max	-0.0316***	-0.0267***	-0.0646***	-0.0821***	-0.0126***	-0.0083***	-0.0698***	-0.0582***
	(0.0069)	(0.0084)	(0.0187)	(0.0309)	(0.0037)	(0.0035)	(0.0176)	(0.0180)
Observations	362	362	332	332	248	248	230	230
R-squared	0.5494	0.4777	-	- 0.5494	0.4777	-	-	
Fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Estimator	PCSE/OLS	PCSE/OLS	IV-GMM	IV-GMM	PCSE/OLS	PCSE/OLS	IV-GMM	IV-GMM
Hansen J-statistic (p-value)	-	-	0.1192	0.1231	-	-	0.5475	0.2615
Kleibergen-Paap LM χ^2-statistic (p-value)	-	-	0.0000	0.0009	-	-	0.0002	0.0004
Anderson-Rubin χ^2 test (p-value)	-	-	0.0012	0.0016	-	-	0.0001	0.0000
Anderson-Rubin F-test (p-value)	-	-	0.0020	0.0025	-	-	0.0005	0.0000
Kleibergen-Paap LM F-statistic	-	-	8.851	5.352	-	-	3.894	3.442

Note: (Panel corrected) standard errors in parentheses; * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$;
HS = high-skilled workers and LS = low-skilled workers

Endogenous variables: Social expenditures/GDP, Total assets × Social exp.

Instruments: Social expenditures/GDP (lag), adjusted annual deficit/GDP, total receipts of general government/GDP, long-term interest rate on government bonds, gross government debt/GDP, real GDP growth, current account balance/GDP, total population, net unemployment replacement rate, trade union density rate, financial openness index, government ideological orientation, Rae's index of electoral fractionalization of the party-system, political voting system, political regime, Herfindahl index of political competition

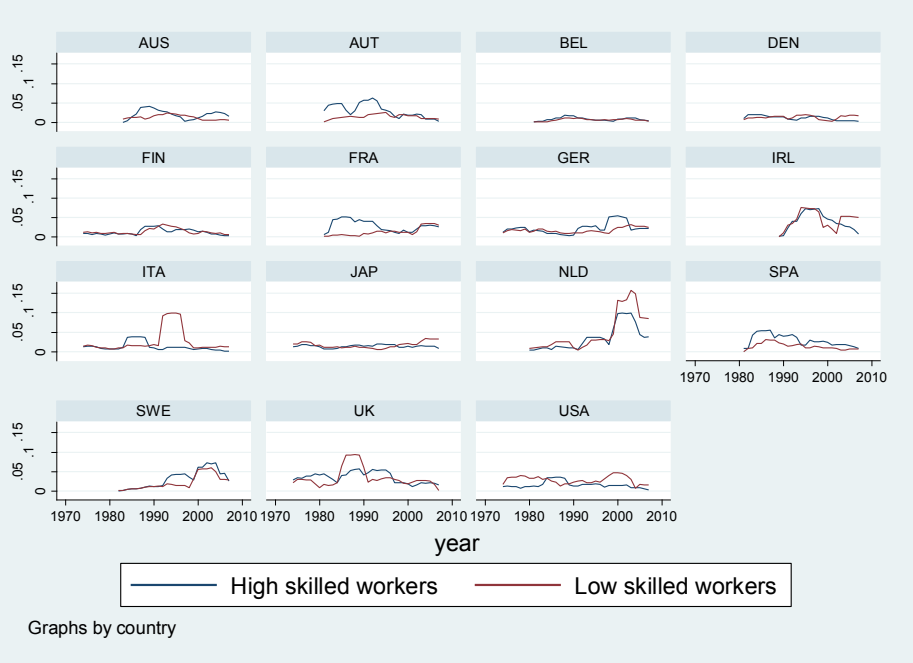

Figure 1: *Volatiltiy of hours worked (by skill groups)*

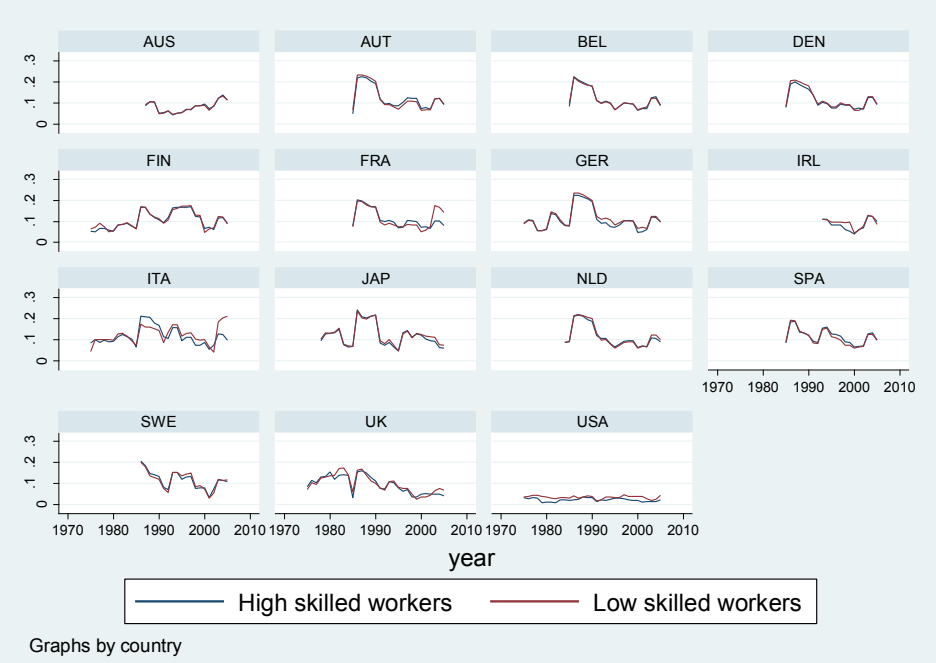

Figure 2: *Volatiltiy of wages (by skill groups)*